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Comparison and Concordance of Academic Air Force Officer Qualifying Test, SAT, and ACT Scores among Air Force ROTC Cadets

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Abstract

A database of U.S. Air Force Reserve Officer Training Corps (ROTC) cadets in the FY2000-2015 commissioning classes was used to estimate the relationships between Air Force Officer Qualifying Test (AFOQT) verbal and math scores and their SAT and ACT counterparts in an Air Force sample. AFOQT Academic Aptitude scores (AA) (based on the 2 verbal and 2 quantitative subtests) were strongly correlated with the respective subtests and composites of both the SAT and ACT, in line with the magnitude of correlation between corresponding subtests and composites of the SAT and ACT. AFOQT-SAT and AFOQT-ACT concordance tables were created based on equipercentile conversions of regression-predicted scores to provide a tool for estimating comparable scores. These estimates suggest that the current Air Force minimums of 15 on the AFOQT-Verbal and 10 on the AFOQT-Quantitative composites correspond to a SAT Verbal score of 430 and SAT Math score of 400, respectively. AFOQT, SAT, and ACT scores were all similarly related to university cumulative GPA. Research limitations and implications for practice are discussed.

Comparison and Concordance of Academic Air Force Officer Qualifying Test (AFOQT),

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The Air Force Officer Qualifying Test (AFOQT) is used to qualify applicants for officer commissions through the Air Force Reserve Officer Training Corps (AFROTC) and Officer Training School (OTS) programs. The test includes a combination of academic ability (verbal, quantitative) subtests used for officer commissioning, as well as spatial ability, and knowledge (aviation, science) subtests that are combined into separate composites used for classification into aircrew training specialties. Minimum qualifying scores for officer commissioning are currently the 15th percentile on the Verbal composite and 10th percentile on the Quantitative composite.

Although the AFOQT is the primary cognitive officer selection test used by the U.S. Air Force, the SAT or ACT are currently used by the accession sources for some purposes. Unlike other accession sources, the U.S. Air Force Academy (USAFA) requires applicants to submit SAT or ACT scores. Additionally, many (but not all) universities with AFROTC detachments require ACT or SAT scores for university admissions. AFROTC now additionally requires SAT or ACT scores for high school scholarship selection.

While in the past three decades AFROTC cadets typically completed the AFOQT as high school seniors or college freshmen, a change in policy now dictates that AFROTC cadets do not complete the AFOQT until after completing two years of college. The AFOQT was developed with the target subject in the junior year of college and previous forms were normed to that standard. One implication of this change is that, particularly in detachments at universities with open admission policies, some cadets may be at risk of failing to meet AFOQT Verbal and Quantitative minimums because their achievement levels reflected the quality of their high

schools, not the first two years of college work. An internal study conducted by HQ AFROTC demonstrated the significant impact of two years of college work on the AFOQT composites necessary for commissioning.

Given the presumed strong relationships between ACT/SAT and AFOQT academic scores, this report provides a concordance table for estimating scores on the AFOQT academic subtests based on ACT/SAT scores. The intent of this diagnostic tool is to allow cadets or detachment leadership to realistically assess a cadet's likelihood of meeting AFOQT minimums, and perhaps encourage cadets to use AFOQT preparation materials or undertake remedial math/English coursework where needed. An additional potential use of this concordance table is to allow for estimated AFOQT scores of USAFA cadets prior to 2008, when only USAFA pilot candidates were required to take the AFOQT. Such concordance may be needed to evaluate potential uses of AFOQT scores for classification into particular career fields across accession sources. Such concordance also may be useful in other future analyses that aim to measure the cognitive abilities of Air Force officers on a common metric.

A secondary purpose of this report is to evaluate the relative validity of AFOQT, ACT, and SAT academic scores for predicting university achievement (GPA). While certainly not the only metric of cadet success, if AFOQT academic scores demonstrate greater validity for predicting GPA than the SAT/ACT, this could potentially argue for the use of AFOQT scores rather than SAT/ACT scores in USAFA admissions.

Method

Sample

Archival data were provided in the form of the Wings database of all cadets in the

FY2000-2015 AFROTC commissioning classes. These data included individuals who were

disenrolled and did not ultimately receive a commission. Of individuals in these year groups,

43,905 individuals had valid scores on the AFOQT. Of these, 4,370 had submitted both ACT and

SAT scores (9.95%), 9,657 had submitted SAT scores only (22.00%), and 7,289 had submitted

ACT scores only (16.60%). Other individuals may not have taken either the ACT or SAT

because their university admissions policy did not require it. For example, many universities

with detachments had open admissions policies, or waived ACT/SAT requirements for transfer

applicants or other applicants with strong high school grades.

Of all cadets tracked in Wings who had taken the AFOQT, the mean AFOQT Verbal

composite score was 46.88 ($SD = 25.28$) and the mean AFOQT Quantitative composite score

was 49.32 ($SD = 25.35$). Individuals who had submitted SAT and/or ACT scores had AFOQT

scores somewhat higher than norm averages (as shown in Tables 1-3). One possibility for this is

that the more competitive individuals tended to enter universities that required SAT/ACT scores

to be submitted.

Overview of SAT, ACT, and AFOQT

SAT. The current SAT Reasoning Test, introduced in 2005, generates separate 200-800

scores on three sections (Mathematics, Critical Reading, and Writing). However, because SAT

Writing scores are not currently tracked by AFROTC this report could not analyze SAT Writing

scores. Additionally, because the data analyzed included individuals entering ROTC programs as

early as 1996, many test-takers would have taken the previous version of the SAT which included an (a) analogies section on the verbal test and a (b) quantitative comparisons section on the Math section (on which test-takers judged which of two expressions was greater, if they were equal, or if it could not be determined).

The current Critical Reading (formerly Verbal) section is based on three scored sections: two 25-minute sections and one 20-minute section (70 minutes total). All sections are multiple-choice (five response options). The content includes a combination of 48 reading comprehension items and 19 sentence completion items. Reading comprehension is based on 100-850 word excerpts from works in natural sciences, humanities, social sciences, and fiction. Reading comprehension questions include 4-6 literal comprehension questions, 12-16 vocabulary in context questions, and 42-50 extended reasoning questions (e.g., synthesize and analyze cause and effect, logic of analogies or arguments, or make other inferences). Sentence completion questions measure knowledge of word meanings and understanding of how different parts of a sentence fit together logically.

The current Mathematics section is based on two 25-minute sections and one 20-minute section (70 minutes total). Format includes 44 multiple-choice, and 10 grid-in student-produced response questions. The content includes numbers and operations (20-25%), algebra and functions (35-40%), geometry and measurement (25-30%), and data analysis, statistics, and probability (10-15%).

There is a penalty for guessing on multiple-choice, but not student-produced grid-in questions (on the math section). On multiple choice questions, applicants receive +1 point for correct answers; -.25 points are subtracted for incorrect answers. No points are subtracted for omitted questions. Because calculator use has been allowed on the math section since 1994 all

test-takers in our AFROTC sample were likely allowed (even graphing or scientific) calculators during the exam. Additionally, the math section provides a reference section with (i) geometric formulas for area, circumference, and volume, (ii) the Pythagorean formula, and special right triangles, and (iii) written indication of the number of degrees in a circle and triangle.

ACT. The ACT generates separate scores ranging from 1-36 in four areas: English, Mathematics, Reading, and Science. The composite score is the average score across the four areas; only the composite was tracked by AFROTC and available for analysis in this report. Unlike the SAT there is no penalty for guessing.

The English test is a 75-question, 45 minute (four-option) multiple-choice test that measures understanding of punctuation, grammar, and usage (Usage/Mechanics), and sentence structure, strategy, organization, and style (Rhetorical Skills). The test consists of five passages followed by a sequence of multiple-choice test questions. Within the passages, certain words and phrases are underlined and numbered; in the questions that follow, test-takers indicate which alternative word or phrase would make the statement appropriate for standard written English, or is worded most consistently with the style and tone of the passage, or if "NO CHANGE" should be made.

The Mathematics Test is a 60-question, 60-minute (five-option) multiple-choice test. Content includes pre-algebra (23%), elementary algebra (17%), intermediate algebra (15%), coordinate geometry (15%), plane geometry (23%), and trigonometry (7%). Calculators are permitted.

The Reading Test is a 40-question, 35-minute (four-option) multiple-choice test that contains reading comprehension questions including literal comprehension and extended

reasoning. Reading comprehension is based on excerpts from natural sciences, humanities, social sciences, and fiction.

The Science Test is a 40-question, 35-minute (four-option) multiple-choice test that measures the interpretation, analysis, evaluation, reasoning, and problem-solving skills required in natural sciences. Scientific information is conveyed through data representation (38%: graphs, tables), research summaries (45%: descriptions of several related experiments), or conflicting viewpoints (17%: expressions of inconsistent hypotheses). Content includes biology, chemistry, physics, and earth/space sciences. However, the test emphasizes reasoning skills rather than recall of scientific content or skill in math. Calculators are not permitted.

AFOQT. The current AFOQT Form S, implemented in 2005, includes the following academic subtests: Verbal Analogies (VA: 25 items, 9 minutes), Word Knowledge (WK: 25 items, 6 minutes), Arithmetic Reasoning (AR: 25 items, 30 minutes), and Math Knowledge (MK: 25 items, 23 minutes). VA and WK are combined into the Verbal composite, AR and MK are combined into the Quantitative composite, and all four subtests are combined into the Academic Aptitude composite. However, the AFROTC dataset available for analysis also included many test takers who took the earlier Forms P or Q which had additionally included a Reading Comprehension subtest (18 minutes, 25 items) on the verbal and academic composites, and a Data Interpretation subtest (24 minutes, 25 items) on the quantitative and academic composites (Thompson, Skinner, Gould, Alley, & Shore, 2010). All questions are (five-response) multiple-choice, and there is no penalty for guessing. Unlike the SAT and ACT, calculators are not permitted.

The Verbal Analogies (VA) subtest measures the ability to recognize relationships such as antonym, synonym, part to part, part to whole, object to attribute, and degree. The analogies

are similar in format to those that appeared on the SAT prior to 2005. The Word Knowledge (WK) subtest measures knowledge of synonym vocabulary. The Reading Comprehension (RC) subtest included prior to 2005 consisted of paragraphs of 40-150 words on a single topic; test-takers must complete the last sentence in the paragraph that best completes (typically best summarizes) the meaning of the paragraph. Hence this section is somewhat of a hybrid between the sentence completion and reading comprehension questions on the SAT. Topics included natural science, social science, and humanities.

Arithmetic Reasoning (AR) consists of word problems involving addition, subtraction, multiplication, division, percentages, ratios, proportions, algebra, and geometry. Characteristics such as height, weight, speed, distance traveled, temperature, and interest earned must be calculated. Math Knowledge (MK) measures knowledge of mathematical relationships, principles, and terms; items are worded so that the need for reading is minimal. Concepts include factoring, geometry, equations, and properties. The Data Interpretation (DI) subtest included prior to 2005 measured ability to interpret information in tables, charts, and graphs. Knowledge of the subject matter of the tables, charts, and graphs is not required to answer the items, although (unlike the ACT Science Test) some questions required calculations based on the data presented such as addition, subtraction, multiplication, division, ratios, proportions, and conversions.

Results

Relationships among AFOQT, ACT, and SAT Subscores

Consistent with expectations, academic AFOQT scores were strongly related to ACT and SAT scores. Of cadets who submitted both ACT and SAT scores, SAT composite scores (math + verbal only) explained 60.92% of variance in ACT composite scores. The correlation between

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ACT and SAT composite scores was similar in magnitude to (a) the correlation between ACT composite scores and AFOQT Academic Aptitude scores, and (b) the correlation between SAT composite scores and AFOQT Academic Aptitude scores. See Table 1.

SAT subscores were strong predictors of corresponding AFOQT subscores. SAT-Math scores explained 54.19% of the variance in AFOQT-Quantitative scores; SAT-Verbal scores explained 55.38% of the variance in AFOQT-Verbal scores. SAT M +V composite scores explained 60.62% of the variance in AFOQT-Academic Aptitude scores. See Table 2.

Generation of Concordance Tables

Given the strong relationships with SAT and ACT scores, concordance tables were generated. The linear regression equations used to generate the SAT-AFOQT and ACT-AFOQT concordance tables were as follows:

AFOQT Verbal = (SAT Verbal * 0.21927) – 73.52256

AFOQT Quantitative = (SAT Math * 0.21360) – 69.65841

AFOQT Academic Aptitude = [(SAT M+V) * (.12931)] – 95.39838

AFOQT Academic Aptitude = [(ACT Composite) * (4.73504)] – 66.40904

One result of linear regression is that some individuals would be predicted to have scores that fall outside of the possible range of values on the AFOQT composites (i.e., below 1 or above 99). Hence, predicted 1-99 scores were created by rounding to the nearest integer and classifying all predicted scores less than 1 as 1s and all predicted scores greater than 99 as 99. Score distributions on these predicted 1-99 scores relative to the observed AFOQT scores appear in the appendix.

Because the regression analysis tended to alter the range and variance of predicted scores relative to observed scores, to better reflect the distribution of observed AFOQT scores,

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equipercentile conversions were applied to the non-adjusted predicted scores. This process assigns cutting points to redistribute the raw predicted scores based on the frequency of each observed AFOQT score. For example, the cutting point for an AFOQT Academic Aptitude (AA) score of 1 (i.e., SAT composite scores of 630 or less) was selected such that the same, or most nearly the same, number of individuals would be predicted to have an AFOQT AA score of 1 as actually obtained an AFOQT AA score of 1 in the sample. The cutting point for an AFOQT AA score of 2 (i.e., SAT composite scores of 640-690) was selected (a) such that the same, or most nearly the same, number of individuals would be predicted to have an AFOQT AA score of 2 as actually obtained an AFOQT AA score of 2 in the sample, and (b) such that the same, or most nearly the same, cumulative number of individuals would be predicted to have an AFOQT AA score of 2 or less as actually obtained an AFOQT AA score of 2 or less in the sample. Note that while the conversion reduced the tendency for predicted scores to be compressed at certain score levels, the rank order of predicted scores was unaffected. Hence equipercentile scores were used as a basis for the concordance tables that appear in Appendix A. These equipercentile scores both better approximate the distribution of observed scores (see Appendix B), and also marginally better predict the observed scores (see Table 4).

Comparison of Relationships with Cumulative University GPA

As shown in Table 5, ACT, SAT, and AFOQT scores were equivalently related to cumulative university GPA. Across samples of examinees, validity coefficients were approximately .23 for AFOQT-AA, ACT composite, and SAT Math+Verbal composites. Validity coefficients across samples were .19-.22 for AFOQT-V and SAT-Verbal, and .20-.21 for AFOQT-Q and SAT-Math.

Discussion

Analyses confirmed that AFOQT academic composites are strongly related to ACT and SAT scores among AFROTC cadets (rs = .72-.78). This is consistent with earlier comparisons between the AFOQT and SAT (Ree & Carretta, 1998; Ree, Carretta, & Earles, 1999). On this basis, concordance tables were generated based on equipercentile conversion of linear regression-predicted scores to estimate the likely AFOQT-AA composite associated with SAT or ACT composites, and AFOQT-V and AFOQT-Q composites associated with respective SAT subscores. For example, the estimates suggest that the current Air Force minimums of 15 on the AFOQT-V and 10 on the AFOQT- Q correspond to an SAT Verbal score of 430 and an SAT Math score of 400. The USAFA reported mean scores for the Class of 2014 of 640 on the SAT Verbal and 666 on the SAT Math. These values would correspond to 77 on the AFOQT-V and roughly 81-84 on the AFOQT-Q.

Like the ACT-SAT concordance tables jointly produced by the ACT and the College Board, a few important caveats are worth noting in interpreting the AFOQT-SAT or AFOQT-ACT concordance tables. The AFOQT academic tests are different from the SAT and ACT, and it is not possible to predict exactly what score a student will get on the AFOQT AA, V, and Q composites based solely on the score obtained on the other test. The concordance tables are intended for developmental use to allow cadets or detachment leadership to realistically assess likely AFOQT scores, and encourage preparation or remedial university coursework where needed. The concordance tables also are intended to support future statistical research and analysis when AFOQT scores are unavailable.

Additional analyses showed that the AFOQT- Academic Aptitude composite, SAT (Math + Verbal), and ACT composite all demonstrated equivalent validity for predicting cumulative undergraduate GPA among AFROTC cadets (rs = .23). The equivalency of predictive validity is notable given the much shorter time in administering the AFOQT verbal/math subtests (i.e., 68 minutes for the four subtests of AFOQT Form S, or 106 minutes for the six subtests of AFOQT Form Q) relative to 140 minutes for SAT Math and Verbal sections, or 180 minutes for the four tests contributing to the ACT composite.

Limitations and Recommendations for Future Research.

Limitations to analyses include the lack of availability of separate ACT scores (Reading, Math, English, Science), or SAT Writing scores (implemented in 2005 as a required part of the SAT I). Separate ACT scores could have allowed for separate AFOQT-V and AFOQT-Q concordance tables, to provide a better diagnostic tool for cadets who have taken the ACT and are concerned about meeting AFOQT minimums. Access to the dates that the SAT was taken would have allowed for comparisons based on changes to the SAT (i.e., elimination of analogies). Future research also should replicate the concordance between SAT or ACT and AFOQT scores among examinees from accession sources other than ROTC.

Finally, it should be noted that the Air Force is currently developing content for AFOQT Form T. Among the tests being considered for inclusion in Form T is a revised version of the Reading Comprehension subtest. Addition of both Reading Comprehension and Written Expression subtests would provide a broader measure of verbal ability and be consistent with the current forms of the SAT and ACT.

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Table 1

Means, Standard Deviations, and Correlations among Test Scores for AFROTC Cadets who

Submitted both SAT and ACT Scores ($N = 4,370$)

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. AFOQT-V	53.50	23.90	--						
2. AFOQT-Q	59.14	23.58	.47	--					
3. AFOQT-AA	57.50	23.56	.84	.87	--				
4. SAT-V	572.60	80.12	**.72**	.42	.65	--			
5. SAT-M	593.14	79.48	.42	**.72**	.66	.51	--		
6. SAT-V+M	1166.00	138.70	.66	.65	**.76**	.87	.87	--	
7. ACT Composite	25.71	3.77	.66	.63	**.75**	.69	.66	**.78**	**--**

Note. All correlations statistically significant, $p < .001$.

Table 2

Means, Standard Deviations, and Correlations among SAT and AFOQT Subtest Scores ($N =$ 14,027)

Variable	*M*	*SD*	1	2	3	4	5	6
1. AFOQT-V	52.55	24.55	--					
2. AFOQT-Q	57.13	24.24	.52	--				
3. AFOQT-AA	55.69	24.50	.86	.88	--			
4. SAT-V	574.40	84.31	**.74**	.47	.68	--		
5. SAT-M	593.57	83.68	.47	**.74**	.69	.56	--	
6. SAT-V+M	1167.97	148.33	.68	.68	**.78**	.88	.88	--

Note. All correlations statistically significant, *p* < .001.

Table 3

Means, Standard Deviations, and Correlations among ACT and AFOQT Subtest Scores ($N =$ 11,659)

Variable	M	SD	1	2	3	4
1. AFOQT-V	49.99	23.95	--			
2. AFOQT-Q	54.74	23.96	.49	--		
3. AFOQT-AA	52.94	23.93	.85	.87	--	
4. ACT composite	25.20	3.80	.66	.65	**.75**	-

Note. All correlations statistically significant, $p < .001$.

Table 4

Correlations between AFOQT Subscores and Corresponding SAT-Predicted and ACT-Predicted

Converted Scores

	Unadj. Regression-Predicted	Predicted 1-99	Equipercentile
SAT-Predicted (N=14,027)			
AFOQT- AA	.779	.781	.785
AFOQT- Verbal	.744	.746	.753
AFOQT- Quant	.736	.738	.741
ACT-Predicted (N=11,659)			
AFOQT- AA	.752	.754	.755

Note. All correlations statistically significant, $p < .001$.

Table 5

Comparison of Correlations between Cumulative GPA and AFOQT, SAT, and ACT, By Sample

		Composites			Verbal		Quantitative	
Sample	*N*	AA	ACT	SAT	V	SAT-V	Q	SAT-M
ACT	11026	.229	.228	--	.190	--	.206	--
SAT	13316	.234	--	.234	.212	.216	.199	.198
ACT/SAT	4124	.227	.235	.229	.194	.200	.195	.198

Note. All correlations statistically significant, $p < .001$.

Appendix A

SAT/ACT-AFOQT Academic Aptitude Concordance Based on Equipercentile Scores

SAT Math + Verbal Composite	ACT Composite	AFOQT- Academic Aptitude
400-630	1-12	1
640-690	13	2
700-720	14	3
730-750	15	4
760-770		5
780-790		6
800	16	7
810		8
820-830		9
840	17	10
850-860		11
870		12
880		13
890	18	14
900		15
910		16
920	19	17
930-940		18
950		19

960		20
970	20	21
980		22
990		23
1000		24
1010		25
	21	26
1020		27
1030		28
1040		29
	22	30
1050		31
1060		33
1070		35
1080	23	36
1090		38
1100		40
1110		43
1120		44
	24	45
1130		47
1140		50
1150		52
1160	25	53

1170		55
1180		58
1190	26	61
1200		63
1210		65
1220		68
	27	69
1230		70
1240		71
1250		73
1260		75
1270	28	76
1280		78
1290		80
1300		81
	29	82
1310		83
1320		84
1330		86
1340		87
1350	30	88
1360		90
1370		91
1380	31	92

1390-1400		93
1410		94
1420-1430	32	95
1440		96
1450-1460	33	97
1470-1510	34	98
1520-1600	35-36	99

SAT-AFOQT Verbal Concordance Based on Equipercentile Scores

SAT Verbal	AFOQT- Verbal
200-310	1
320-330	2
340-350	3
360	4
370	5
380	7
390	8
400	10
410	12
420	13
430	15
440	16
450	17
460	18
470	20
480	23
490	25
500	27
510	30
520	33
530	36
540	40

550	42
560	46
570	50
580-590	56
600	60
610	65
620	69
630	72
640	77
650	78
660	81
670	84
680	87
690	90
700	92
710	93
720	95
730	96
740-750	97
760	98
770-800	99

SAT-AFOQT Quantitative Concordance Based on Equipercentile Scores

SAT Math	AFOQT- Quant
200-290	1
300-320	2
330-350	3
360	5
370	6
380	8
390	9
400	10
410	11
420	13
430	15
440	16
450	17
460	19
470	21
480	22
490	25
500	28
510	30
520	33
530	34
540	38
550	41
560	43

570	48
580	52
590	55
600	59
610	63
620	67
630	71
640	75
650	78
660	81
670	84
680	85
690	88
700	91
710	92
720	94
730	95
740	96
750-760	97
770-780	98
790-800	99

Appendix B

Comparison of Observed and Predicted AFOQT-AA Score Distributions, Based on SAT

V+M Scores ($N = 14{,}027$)

AFOQT-AA	Frequency			Cumulative Frequency		
	Observed	Regression-Predicted	Equipercentile	Observed	Regression-Predicted	Equipercentile
1	12	68	11	12	68	11
2	17	7	17	29	75	28
3	25	14	23	54	89	51
4	25	20	24	79	109	75
5	35	16	34	114	125	109
6	38		31	152		140
7	26	15	31	178	140	171
8	28	31	24	206	171	195
9	68	24	58	274	195	253
10	40		43	314		296
11	66	26	90	380	221	386
12	50	32	52	430	253	438
13	41	43	61	471	296	499
14	50		59	521		558
15	58	38	75	579	334	633
16	152	52	99	731	386	732
17	104	52	89	835	438	821
18	164	61	199	999	499	1020
19	101		109	1100		1129
20	91	59	124	1191	558	1253
21	194	75	117	1385	633	1370
22	127	99	151	1512	732	1521
23	145		124	1657		1645
24	107	89	200	1764	821	1845
25	138	94	181	1902	915	2026
26	137	105		2039	1020	
27	141	109	194	2180	1129	2220
28	237		223	2417		2443
29	155	124	215	2572	1253	2658
30	36	117		2608	1370	
31	172	151	219	2780	1521	2877
32	39			2819		
33	168	124	240	2987	1645	3117
34	148	200		3135	1845	
35	236	181	282	3371	2026	3399
36	156	194	306	3527	2220	3705

37	229			3756		
38	351	223	296	4107	2443	4001
39	40	215		4147	2658	
40	199	219	395	4346	2877	4396
41	183			4529		
42	98	240		4627	3117	
43	184	282	388	4811	3399	4784
44	256	306	391	5067	3705	5175
45	191			5258		
46	76	296		5334	4001	
47	164	395	397	5498	4396	5572
48	80	388		5578	4784	
49	166	391		5744	5175	
50	256		415	6000		5987
51	198	397		6198	5572	
52	200	415	380	6398	5987	6367
53	247	380	390	6645	6367	6757
54	453			7098		
55	4	390	397	7102	6757	7154
56	77	397		7179	7154	
57	191	389		7370	7543	
58	103	389	389	7473	7932	7543
59	202			7675		
60	93	444		7768	8376	
61	184	397	389	7952	8773	7932
62	259	360		8211	9133	
63	168		444	8379		8376
64	49	374		8428	9507	
65	219	329	397	8647	9836	8773
66	83	303		8730	10139	
67	202			8932		
68	249	297	360	9181	10436	9133
69	185	309		9366	10745	
70	254	294	374	9620	11039	9507
71	188	274	329	9808	11313	9836
72	200			10008		
73	49	247	303	10057	11560	10139
74	48	253		10105	11813	
75	216	245	297	10321	12058	10436
76	272		309	10593		10745
77	66	201		10659	12259	
78	149	199	294	10808	12458	11039
79	226	171		11034	12629	
80	176	180	274	11210	12809	11313
81	190		247	11400		11560
82	179	136		11579	12945	
83	164	133	253	11743	13078	11813
84	151	130	245	11894	13208	12058

85	209			12103		
86	159	104	201	12262	13312	12259
87	126	92	199	12388	13404	12458
88	137	112	171	12525	13516	12629
89	119			12644		
90	148	68	180	12792	13584	12809
91	157	80	136	12949	13664	12945
92	142	68	133	13091	13732	13078
93	216	47	234	13307	13779	13312
94	110		92	13417		13404
95	152	34	180	13569	13813	13584
96	95	45	80	13664	13858	13664
97	129	23	115	13793	13881	13779
98	124		151	13917		13930
99	110	146	97	14027	14027	14027

Comparison of Observed and Predicted AFOQT-Verbal Score Distributions, Based on SAT-V

Scores ($N = 14{,}027$)

AFOQT-Verbal	Frequency			Cumulative Frequency		
	Observed	Regression-Predicted	Equipercentile	Observed	Regression-Predicted	Equipercentile
1	21	60	22	21	60	22
2	18		24	39		46
3	41	16	30	80	76	76
4	27		31	107		107
5	31	31	32	138	107	139
6	18			156		
7	24		43	180		182
8	27	32	48	207	139	230
9	45			252		
10	41	43	73	293	182	303
11	42			335		
12	44	48	93	379	230	396
13	78		121	457		517
14	39	73		496	303	
15	294		164	790		681
16	5	93	168	795	396	849
17	181		231	976		1080
18	315		224	1291		1304
19	160	121		1451	517	
20	2		285	1453		1589
21	245	164		1698	681	
23	211	168	338	1909	849	1927
24	210			2119		
25	94	231	417	2213	1080	2344
26	221			2434		
27	363	224	398	2797	1304	2742
28	7			2804		
29	70			2874		
30	274	285	485	3148	1589	3227
31	64			3212		
32	321	338		3533	1927	
33	299		563	3832		3790
34	1	417		3833	2344	
35	146			3979		
36	299	398	610	4278	2742	4400

37	5			4283		
38	352	485		4635	3227	
39	91			4726		
40	304	563	675	5030	3790	5075
41	371			5401		
42	63		644	5464		5719
43		610			4400	
44	402			5866		
45	73	675		5939	5075	
46	300		707	6239		6426
47		644			5719	
48	438			6677		
49		707			6426	
50	459		691	7136		7117
51	5	691		7141	7117	
52	145			7286		
53	299			7585		
54	4	647		7589	7764	
55	314			7903		
56	146	608	1255	8049	8372	8372
57	298			8347		
58	2	706		8349	9078	
59	122			8471		
60	297	531	706	8768	9609	9078
62	462	631		9230	10240	
63	1			9231		
64	284			9515		
65	91	551	531	9606	10791	9609
66	73			9679		
67	271	436		9950	11227	
68	79			10029		
69	140	425	631	10169	11652	10240
70	69			10238		
71	5	428		10243	12080	
72	190		551	10433		10791
73	6	365		10439	12445	
74	363			10802		
75	73			10875		
76	7	265		10882	12710	
77	302		436	11184		11227
78	266	264	425	11450	12974	11652
79	51			11501		
80	4	243		11505	13217	

81	303		428	11808		12080
82	85	184		11893	13401	
83	89			11982		
84	222	117	365	12204	13518	12445
85						
86	265			12469		
87	255	115	265	12724	13633	12710
88	54			12778		
89	6	69		12784	13702	
90	223		264	13007		12974
91	2	69		13009	13771	
92	222		243	13231		13217
93	174	75	184	13405	13846	13401
94	54			13459		
95	59	67	117	13518	13913	13518
96	96		115	13614		13633
97	136		138	13750		13771
98	138	21	75	13888	13934	13846
99	139	93	181	14027	14027	14027

Comparison of Observed and Predicted AFOQT-Quant Score Distributions, Based on SAT-M

Scores (N=14,027)

AFOQT-Quant	Frequency			Cumulative Frequency		
	Observed	Regression-Predicted	Equipercentile	Observed	Regression-Predicted	Equipercentile
1	14	43	13	14	43	13
2	17		19	31		32
3	31	11	37	62	54	69
4	9			71		
5	17	15	24	88	69	93
6	29		25	117		118
7		24			93	
8	46		28	163		146
9	33	25	44	196	118	190
10	37		62	233		252
11	96		77	329		329
12	19	28		348	146	
13	23		87	371		416
14	86	44		457	190	
15	74		105	531		521
16	62	62	123	593	252	644
17	189		155	782		799
18	30	77		812	329	
19	184		176	996		975
20	4	87		1000	416	
21	290		182	1290		1157
22	38	105	253	1328	521	1410
23	3			1331		
24	165	123		1496	644	
25	31		270	1527		1680
26	354	155		1881	799	
27	1			1882		
28	177		333	2059		2013
29	28	176		2087	975	
30	39		344	2126		2357
31	368	182		2494	1157	
32	80			2574		
33	234	253	451	2808	1410	2808
34	455		413	3263		3221
35	49	270		3312	1680	

36	44			3356		
37	58	333		3414	2013	
38	236		463	3650		3684
39	39	344		3689	2357	
40	58			3747		
41	233	451	574	3980	2808	4258
43	731		615	4711		4873
44	3	413		4714	3221	
45	349			5063		
46	53	463		5116	3684	
47	2			5118		
48	366	574	642	5484	4258	5515
49	5			5489		
50	49	615		5538	4873	
51	2			5540		
52	668	642	658	6208	5515	6173
53	60			6268		
54	309	658		6577	6173	
55	132		702	6709		6875
56	4	702		6713	6875	
57	329			7042		
58	126			7168		
59	297	659	659	7465	7534	7534
60	128			7593		
61	313	715		7906	8249	
63	80	676	715	7986	8925	8249
64	348			8334		
65	10	646		8344	9571	
66	324			8668		
67	118	605	676	8786	10176	8925
69	383	672		9169	10848	
70	86			9255		
71	273	527	646	9528	11375	9571
72	94			9622		
73	75	428		9697	11803	
75	344		605	10041		10176
76	380	380		10421	12183	
77	1			10422		
78	346	327	672	10768	12510	10848
79	87			10855		
80	255	327		11110	12837	
81	150		527	11260		11375
82	244	275		11504	13112	

83	84			11588		
84	65	232	428	11653	13344	11803
85	263		380	11916		12183
86	276	121		12192	13465	
87	10			12202		
88	127	143	327	12329	13608	12510
89	3			12332		
90	266			12598		
91	261	94	327	12859	13702	12837
92	239		275	13098		13112
93	80	92		13178	13794	
94	139		232	13317		13344
95	193	47	121	13510	13841	13465
96	106		143	13616		13608
97	165	58	186	13781	13899	13794
98	108		105	13889		13899
99	138	128	128	14027	14027	14027

Comparison of Observed and Predicted AFOQT-AA Score Distributions, Based on ACT

Composite Scores (N=11,659)

AFOQT-AA	Frequency			Cumulative Frequency		
	Observed	Regression-Predicted	Equipercentile	Observed	Regression-Predicted	Equipercentile
1	13	50	10	13	50	10
2	17		7	30		17
3	32		33	62		50
4	24		42	86		92
5	35	42		121	92	
6	37			158		
7	28		92	186		184
8	18			204		
9	74	92		278	184	
10	59		153	337		337
11	54			391		
12	45			436		
13	47			483		
14	49	153	241	532	337	578
15	62			594		
16	154			748		
17	83		343	831		921
18	134			965		
19	84	241		1049	578	
20	91			1140		
21	198		479	1338		1400
22	108			1446		
23	112			1558		
24	102	343		1660	921	
25	127			1787		
26	109		539	1896		1939
27	128			2024		
28	229	479		2253	1400	
29	160			2413		
30	24		641	2437		2580
31	149			2586		
32	24			2610		
33	153	539		2763	1939	
34	141			2904		
35	179			3083		

36	151		825	3234		3405
37	196			3430		
38	298	641		3728	2580	
39	26			3754		
40	177			3931		
41	165			4096		
42	70	825		4166	3405	
43	149			4315		
44	216			4531		
45	173		1351	4704		4756
46	61			4765		
47	154	1351		4919	4756	
48	64			4983		
49	172			5155		
50	233			5388		
51	160			5548		
52	225	1285		5773	6041	
53	227		1285	6000		6041
54	393			6393		
55	4			6397		
56	65			6462		
57	164	1220		6626	7261	
58	83			6709		
59	170			6879		
60	85			6964		
61	167	1160	1220	7131	8421	7261
62	234			7365		
63	159			7524		
64	47			7571		
65	192			7763		
66	78	990		7841	9411	
67	140			7981		
68	220			8201		
69	175		1160	8376		8421
70	214			8590		
71	158	774		8748	10185	
72	162			8910		
73	30			8940		
74	48			8988		
75	160			9148		
76	234	594	990	9382	10779	9411
77	52			9434		
78	111			9545		

79	162				9707		
80	135	410			9842	11189	
81	138				9980		
82	126			774	10106		10185
83	114				10220		
84	121				10341		
85	127	242			10468	11431	
86	114				10582		
87	99				10681		
88	89			594	10770		10779
89	87				10857		
90	93	143			10950	11574	
91	98				11048		
92	90			410	11138		11189
93	138				11276		
94	60				11336		
95	96	61	242		11432	11635	11431
96	53				11485		
97	65		143		11550		11574
98	55		61		11605		11635
99	54	24	24		11659	11659	11659